

ATLO-OCCIPITAL DISLOCATION.

A CASE OF FRACTURE OF THE ATLAS AND AXIS, AND FORWARD DISLOCATION OF THE OCCIPUT ON THE SPINAL COLUMN, LIFE BEING MAINTAINED FOR THIRTY-FOUR HOURS AND FORTY MINUTES BY ARTIFICIAL RESPIRATION, DURING WHICH A LAMINECTOMY WAS PERFORMED UPON THE THIRD CERVICAL VERTEBRA.

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AT 1.05 P.M., Sept. 18, 1907, the patient G. F. G., Ordinary Seaman, U. S. N., aged 19 years and 3 months, was doing some gymnastic exercises on the gun deck of the U. S. S. New Jersey, and while attempting the trick known as "cutting off," his hands slipped, and he fell to the deck, a distance of about four feet, landing on the right side of his head, the weight of his body being above and his head and neck bent underneath. He was immediately picked up by his companions and carried down to the sick bay, as he was unable to walk and apparently unconscious. He was at once seen by the medical officer on duty, who finding him cyanotic and gasping for breath immediately started artificial respiration. Upon examination the following condition was discovered:

Complete paralysis both motor and sensory, from the line of the larynx down. Muscles were flaccid, with no rigidity anywhere, and no constrained position assumed by any of the extremities. All reflexes were lost and remained so while life lasted, with the single exception of the plantar reflex which returned very slightly about five hours after the accident. Priapism was present within the first half hour and remained constant until death supervened. There was an involuntary evacuation of the bowels within the first fifteen minutes, but no passage of urine, which had to be withdrawn with a catheter.

Patient was perfectly conscious during the whole period of life, hearing and understanding everything that was said to him, replying either by winking the eyes, noddings and shakings of the head, or when air was being forced through the larynx, by a few spoken words. At all times he could move his lips

and tongue, forming words, but no articulate sound could be made, except when aided by very forcible pressure on the chest walls. The paralysis of respiration was complete, and as far as could be discovered there was no organ below the larynx that was performing its normal functions with the single exception of the heart. In attempting to breathe there would be frequent tracheal tugs, and the tongue would be protruded and the face screwed up whenever the patient tried to swallow. There was no sense of thirst or hunger, and after a little water had been given the patient by means of a medicine dropper, he refused to take anything which had to be swallowed. Contrary to the expectation and as naturally follows in breathing through the mouth, there was no dryness of the tongue and fauces but they appeared to be always moist. When first seen and when the efforts of the patient to breathe were most pronounced there appeared to be a narrowing of the fauces, caused by a protrusion of the posterior wall. The eyes were at first closed, and on opening them there was an external strabismus and the pupils were reduced to pin points, both of which conditions improved until the eyes became almost normal, responding to light and at all times were symmetrical.

At first the heart was almost inaudible and very slow and the patient was pulseless but under the influence of artificial respiration and cardiac stimulants the strength increased and the beats reached 72, being full and strong but irregular and intermittent, sometimes dropping two or three and at other times giving an abortive beat.

Patient at no time seemed to suffer from pain, but on being questioned said "my head hurts." The body surface temperature was good at first but later fell and had to be maintained by the application of hot water bottles. There did not seem to be any area of hyperæsthesia or any marked degree of sweating in any part until on the second day the body sweat so that it was thought that there had been an evacuation of urine. A careful examination of the spinal column in the cervical region revealed no dislocation as far as the spinous processes were concerned, but there seemed to be an unusual depression between the atlas and the base of the occiput. Believing that this might be a dislocation an attempt was made by extension and counter extension with manipulation of the cervical vertebra, to effect a reduction, but

with no permanent results or improvement in the general condition.

As all the symptoms pointed to an injury at or above the third cervical vertebra, as nothing so far had effected any relief of the symptoms, and as the patient was only kept alive by means of artificial respiration, which could not be continued indefinitely, it was decided, in the hope that perhaps there was not a complete transverse lesion of the cord, to do a laminectomy on the third cervical vertebra, and to relieve any pressure which might exist either as the result of hemorrhage, fracture, dislocation or spicule of bone which had penetrated the spinal cord. The question then arose as to how to operate on the back of a patient's neck, who must be on his back in order to receive artificial respiration. It was suggested that he might be put on his side and unilateral respiratory movements be made or on his back and pressure exerted on his back. He was accordingly turned on his side, and artificial respiration applied with one arm, which seemed to supply a certain amount of air, but the patient's color soon showed that he was not getting sufficient. He was then turned on his face, his forehead and chin being supported by hard pillows. What was our surprise to hear him gasp, and the artificial respiratory movements being stopped, the patient began to breathe, the diaphragm performing the work alone. In this position and in this way the patient continued to breathe for seven minutes, when he gradually became cyanotic and ceased breathing, and he was immediately put on his back and artificial respiration recommenced.

It was therefore decided that the operation must be done with the patient on his back, if it was to be done at all. The field of operation was then prepared in the usual way and an aseptic towel placed about the head to act as a sling. The patient was placed on the table with the head and neck extending beyond the end and supported by a nurse holding the sling. One nurse was on each side of the table, each having an arm and doing the usual motions for artificial respiration. The operator on a low stool had to work much as a fresco painter does when painting a ceiling. It was found that by slightly elevating the head, the field of operation was better exposed,* but also the bending of the neck cut off the passage of air to the lungs to a certain extent, and every few minutes the head had to be lowered to the horizon-

tal position and artificial respiration applied more vigorously. With these frequent interruptions the operation required much more time than it would ordinarily do, as can well be imagined. Of course no anæsthetic could be given by inhalation and as all sensation was lost from the middle of the neck down it was only necessary to inject some cocaine solution, to destroy the sensation in the small part of the field of operation that was still supplied with active nerve influences. The patient was perfectly conscious during the whole operation and felt absolutely no pain. The operation was begun about 11.30 P.M. and completed at 1.50 A.M. It is not necessary to describe the various steps of the operation as they are well known to all. The spinous processes and laminæ being exposed, no fracture could be felt but there seemed to be increased lateral motion of the atlas and the dislocation of the occiput forward on the spinal column was very evident, but all attempts to reduce it and have it remain in position failed. The spinous process and laminæ of the third cervical vertebra were removed and the membranes of the cord exposed. Aside from the fact that there was a slight congestion these appeared to be perfectly normal and were not disturbed. Patient stood the operation well, and except for a little extra stimulation on account of the heart action, he required no special treatment, and showed no ill effects. But no good results were noticed. He continued in the same condition until about 10. A.M. of the 19th, when he vomited a bile stained fluid; 800 c.c. of urine were drawn off, and at 11 A.M. he vomited again. About noon there appeared some blood stained moisture on the sheet under the patient, and it was feared there might be some recurrent hemorrhage from the wound. This was examined and found in perfect condition, clean, dry and healthy, and it was then discovered that the moisture on the sheet was caused by most profuse sweating of the patient's body.

During the afternoon patient had several sinking attacks when he became pulseless and could only be revived by heroic efforts. He remained conscious up to the last except during these syncopal attacks, but the heart grew gradually weaker responding less and less to stimulation and he finally died at 11.45 P.M., September 19th.

A postmortem was held at 10 A.M., Sept. 20th, ten and a quarter hours after death, and the following condition found:

The occiput was dislocated forward on the spinal column, and the cord nipped between the posterior edge of the foramen magnum and the posterior surface of the odontoid process of the axis. The atlas was fractured in three places, twice laterally just at the point of attachment of the transverse or check ligament, and once posteriorly. The odontoid process was broken off short on a line with the superior articular surface of the axis. The membranes of the cord were intact, but the cord itself was reduced to a pulpy mass from the level of the foramen magnum to the interval between the axis and the third cervical vertebra.

From the disclosures at the postmortem we are convinced that nothing could have been done to save the patient's life, and the wonder is that he should have lived so long. Had it not been for the prompt action of Assistant Surgeon M. H. Ames, U. S. N., in starting artificial respiration and the untiring efforts of the corps of nurses and assistants in administering the same, this would have been one of the cases of practically instantaneous death that are so common with a broken neck.

Medical literature is full of reports of cases of fracture, dislocations of the vertebra, and discussions of the symptoms, treatment and prognosis of spinal injuries, but in a most careful search, we have been able to find but one reported case similar to our own, as to location and character of fracture, when artificial respiration was carried on for three and a half hours, and no case under similar conditions where an operation was performed or life prolonged for so many hours. We are therefore led to believe that the case is unique, and report it as such. There are many observations which it would have been most interesting to make, but which were rendered practically impossible by the conditions, and the small chance of taking observations for fear of interfering with the artificial respiration.